Computer Science

A Bit About Us

Computer Science is one of the most dynamic, fast moving and innovative sectors in the world, and there is an increasing demand for talented students to undertake careers in Computer Science related industries such as medicine, business, engineering and computing.

Our aim is to develop our students knowledge and understanding of the fundamental principles of Computer Science like computational thinking, networking and data representation. Our students will also use a variety of programming languages, including python, to solve real world problems.

We provide our students with the opportunity to study the subject at GCSE level, preparing them for study at A-Level and beyond.

The subject is taught by experienced teachers who have a real interest in the subject. We are an innovative department, always seeking new and exciting ways to enthuse our learners. At present the department is in the process of experiencing physical computing through the use of our Raspberry Pi's.

Extra Curricular

Our extra-curricular club will shortly be up and running. Here students will be given the opportunity to continue experimenting with physical computing through Minecraft and Robotics.

Homework

Our home learning provision is set out in detail on the Home Learning section of the website which can be accessed here <u>Computing Home Learning</u>

<u>HOME LEARNING COMPUTER SCIENCE Y9-11</u>

Independently

These tasks are designed to build students' independence using flipped learning. This could include doing research, some reading or recapping prior learning before a lesson.

Each week students are given a topic and are expected to produce a page of A4 notes on the topic in their homework book.

To assist students producing their A4 notes page, all have access to 'Exa Moodle'. This is a webpage listing relevant lecture videos, text book page numbers and hyperlinks for each of the set topics. Students independently select the resources they wish to use when producing their notes.

When will this be completed?

Once a week

Make

These tasks are designed to support students' learning, based around Learning Scientists themes. They will include a focus on memory, revision techniques and note-taking.

Keywords – for each unit of work students can use the supplied keywords to produce a set of flashcards defining each of the keywords. Students can start independently and use the class material to plug gaps and check their understanding.

Quiz – students can create their own Kahoot quiz based on the most recent lesson or unit of work. Students can start independently, deciding on the questions and the multiple choice options. Students can use their class material to plug gaps and check their understanding.

Key Questions – Each theory lesson students are assigned learning material on google classroom. The key questions are listed and are often discussed in class. Revisit these questions and answer them.

Programming – students can create an account at codeacademy.com and snakify.org. Both offer free online python 3 courses for students to follow and embedded their understanding of programming.

When will this be completed?

Optional

Progress

These tasks will help students secure their progress by practising/preparing for the next assessment. This could include planning or completing exam style questions.

During each theory lesson students have a number of exam questions to complete in their assessment books. These are marked and returned to students with feedback to correct misunderstanding, clarify understanding or to extend learning.

At the end of each unit of work students complete a range of activities in a 'revision pack' including exam questions to prepare for the end of unit assessment.

Should a student preform under target in an end of strand/unit assessment booster work will be set. This includes a number of key questions that need to be researched and reported on. Students are also expected to complete additional exam questions on all topics from the unit of work to further diagnose any misunderstand.

When will this be completed?

At the end of each unit of work (typically 1 per strand)

Y7 STRAND 1 IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Repeat instructions in Scratch (loop)

- Follow and write a plan (Pseudo code)

- Explain and give examples of variables

- Create and use multiple variables

- Create and use broadcasts

- Explain how broadcasts work

- Using if statements

- Add sprites that when clicked change variables

- Creating lists (data structures)

- Randomly picking items from a list

Assessed Tasks:

Students are assigned a task within the strand that is marked and returned to the student highlighting successes and ways to improve. The student is given an opportunity to make the improvements in the next lesson to ensure additional progress is made.

SMSC & British Values:

S: Explore imaginary situations

M: Reflect on the possible consequences of different actions and situations.

S: Testing and feeding information back to peers

C: Pets in other cultures

Enrichment Ideas:

A free online version of Scratch is available to use at https://scratch.mit.edu/. You can also find tutorials to work through allowing you to reinforce the programming techniques listed in the key content section above.

Assessment Criteria:

Securing:

Implement simple pseudo code and apply a range of basic programming techniques to develop a simple solution in scratch.

Mastering/Excelling:

Demonstrate writing and interpreting pseudo code taking care to ensure the language used is appropriate, paying specific attention to correctly indenting. Implement a range of advanced programming techniques to produce an effective and efficient solution that includes the use of while loops, if/else statements and a list in which random elements are selected.

Literacy/Numeracy:

Key words: Variable, broadcast, selection, pseudo code, sprite, lists, random.

Careers Links(CAEIG)

Programmer

Software developer/engineer

Engineer

Intervention Tasks:

A range of intervention tasks are beginning to be made available on Moodle for each strand.

Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Year 7 Home Learning Expectations: Computer Science

When/how will homework be set?	Homework is not set for Computer Science in Year 7 and 8 but students are recommended to focus on the enrichment ideas listed above.
How long should each task take?	Not applicable
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Y7 STRAND 2 IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Understand why we network computers
- Understand the difference between LAN and WAN
- Know the hardware required for a LAN
- Identify three network topologies
- Describe the internet
- Know how data is distrusted across networks via data packets
- Know how IP addresses are used to identify our location on the internet

- Discuss bandwidth and buffering
- Identify data which should be kept secure
- Explain how data might be encrypted
- Demonstrate applying a simple encryption

Assessed Tasks:

Students are assigned a task within the strand that is marked and returned to the student highlighting successes and ways to improve. The student is given an opportunity to make the improvements in the next lesson to ensure additional progress is made.

SMSC & British Values:

S: Imagine & v visualise the WWW

M: Should all data be encrypted?

S: Impact of connecting globally

C: How some cultures limit internet access

Enrichment Ideas:

Using a free online tool compare the bandwidth of your internet connection to your friends and family. Does a fibre service make any difference to this?

Assessment Criteria:

Securing:

Name the key items of hardware required when networking computers and explain the difference between a LAN and a WAN. Draw simple network topologies. Define the internet and explain what is meant by bandwidth.

Mastering/Excelling:

Demonstrate an understanding of the key networking components by explaining the roles and differences between a hub, switch and router. Show through simulations and drawings knowledge of local and wide area networks and the differences between them. Explain that data is transmitted in data packets, understand the importance of IP addressing and explain public key encryption.

Literacy/Numeracy:

Key words: Local Area Network (LAN), Wide Area Network (WAN), Router, Switch, Hub, Bandwidth, Internet, Encryption, Public Key, Buffering, Topologies, IP address, DNS and Data Packets.

Careers Links(CAEIG)

Network technician/manager

IT Helpdesk support

Intervention Tasks:

A range of intervention tasks are beginning to be made available on Moodle for each strand.

Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Year 7 Home Learning Expectations: Computer Science

When/how will homework be set?	Homework is not set for Computer Science in Year 7 and 8 but students are recommended to focus on the enrichment ideas listed above.
How long should each task take?	Not applicable
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Y8 STRAND 1 IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Identify steps in a process
- Sequence instructions in a flowchart
- Create flowcharts for a control system
- Construct a flowchart using the start/stop, output, process and decision symbols
- Give examples of control systems
- Understand the need for a decision symbol
- Control a system with multiple decision symbols
- Create a flowchart with subroutines
- Implement a flowchart with subroutines

Assessed Tasks:

Students are assigned a task within the strand that is marked and returned to the student highlighting successes and ways to improve. The student is given an opportunity to make the improvements in the next lesson to ensure additional progress is made

SMSC & British Values:

S: How can control systems improve our lives?

M: Is it right to monitor individuals' movements and communications?

S: Are human actions always right?

C: Are control systems used or thought of differently in different cultures?

Enrichment Ideas:

Grab a stopwatch and a pen to monitor a set of traffic lights in the community. Use the information you collect to produce your own flowchart of the traffic lights – perhaps ask a friend/relative to then test it!

Assessment Criteria:

Securing:

Demonstrates an understanding of control systems and can give examples. Creates a flowchart to control systems showing an understanding of the input/output and decision symbols.

Mastering/Excelling:

Is able to interpret flowcharts independently. Selects the correct symbols when producing flowcharts for control systems. Is able to use subroutines within a flowchart effectively and ensures out robust testing to ensure systems operate correctly.

Literacy/Numeracy:

Key words: Control System, Mimic, Flowcharts, Input, Output, Process, Decision, Subroutine.

Careers Links(CAEIG)

Control systems engineer

Information systems developer

Systems manager

Intervention Tasks:

A range of intervention tasks are beginning to be made available on Moodle for each strand.

Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Year 8 Home Learning Expectations: Computer Science

When/how will homework be set?	Homework is not set for Computer Science in Year 7 and 8 but students are recommended to focus on the enrichment ideas listed above.

How long should each task take?	Not applicable
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Y8 STRAND 2 IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Decompose problems
- Sequence instructions
- Design algorithms
- Produce flowcharts and pseudocode
- Apply a range of programming techniques including print, input, selection, iteration and lists
- Use a range of data types
- Understand indentation
- Write and call procedures
- Pass variables to procedures

Assessed Tasks:

Students are assigned a task within the strand that is marked and returned to the student highlighting successes and ways to improve. The student is given an opportunity to make the improvements in the next lesson to ensure additional progress is made.

SMSC & British Values:

S: Appreciate that all computer programs contain code

M: Understand the consequences of not testing programs for life saving systems

S: Working together to decompose problems

C: Do programmers from other cultures program in English?

Enrichment Ideas:

Repl.it and Codecademy are excellent free online courses to extend and embed Python programming outside of lessons. A Raspbery Pi and the resources on their website are also excellent to extend learning.

Assessment Criteria:

Securing:

Demonstrate the ability to break a problem into several smaller parts and turns a sequence into a flowchart. Designs are implemented through a range of programming techniques including print, input, selection and iteration.

Mastering/Excelling:

Shows an understanding of pseudocode and the importance of indentation. The full range of programming techniques have been applied efficiently including the use of loops to access items in a list. Programs contain procedures and values are passed for processing.

Literacy/Numeracy:

Key words: Variable, data type, input, output, print, input, if, elif, else, selection, iteration, while, for, list, append, loop, assign, flowchart, pseudocode.

Careers Links(CAEIG)

Programmer

Computer games developer

Software developer/engineer

Engineer

Intervention Tasks:

A range of intervention tasks are beginning to be made available on Moodle for each strand.

Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Year 8 Home Learning Expectations: Computer Science

When/how will homework be set?	Homework is not set for Computer Science in Year 7 and 8 but students are recommended to focus on the enrichment ideas listed above.
How long should each task take?	Not applicable
Will this work be marked by a teacher?	No

How will Home Learning/ intervention tasks be used if a student is underachieving?	Should a student underperform they will be directed to the intervention tasks available on Moodle and are invited to work on these during the Monday lunchtime booster session.

Y9 STRAND 1 (T1-5) IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Purpose of the Central Processing Unit
- The function of the CPU
- Von Neumann architecture
- Common CPU components and their functions
- CPU performance
- Embedded Systems
- Flowcharts
- Programming techniques
o Variables
o Assignment

Assessed Tasks:

Each theory lesson students complete exam style questions in their assessment books.

At the end of each strand a range of assessments take place that include multiple choice questions and traditional exam questions.

SMSC & British Values:

S: Inspire fascination in how computers work

M: Understand the implications of faster processing

S: Working together to produce a diagram of the CPU

C: How do engineers from different cultures collaborate?

Enrichment Ideas:

Explorer the devices you have at home and compare the performance of their CPU's – sky box, Xbox, phones, tablets, desktops, etc.

Assessment Criteria:

Grade 3-4

- Describe the purpose and function of the CPU
- State what characteristics of a CPU can affect its performance

- Label most aspects of a the CPU correctly including: Main memory, Processor, Data Bus, Address Bus
- To be able to describe the Fetch-Execute Process

Grade 5-6

- Describe the effects of increasing the Clock Speed on the computers performance
- Describe the effects of increasing the Cache Size on the computers performance
- Describe the effects of increasing the Number of Cores on the computers performance
- Describe the differences between the MAR and the MDR
- Describe the differences between the ALU and the CU

Grade 7-9

- To be able to give the specific effects on performance time of improving the clock speed and number of cores on a CPU
- Describe how data/instructions are fetched from main memory
- To be able to give a thorough description of the Fetch-Execute cycle including use of all associated busses and registers

Describe the differences between the fetch part and the execute part of the fetch-execute cycle, describing which registers are used in which part

Literacy/Numeracy:

Key words: Processor, MHz, GHz, Hertz, Instruction, Execute, Embedded System, Clock Speed, Cache, Core, Von Neumann Architecture, Memory Address Register, Memory Data Register, Program Counter, Accumulator, Arithmetic Logic Unit, Control Unit, Busses.

Careers Links (CAEIG)

Software engineer

Systems Architect

Intervention Tasks:

Consisting of:

- Lecture videos
- Keyword definition
- Key questions
- Research & present

Depending on the individual student's area of weaknesses highlighted by end of strand tests, students are set a range of the above tasks to bridge the gap in their understanding.

Year 9 Home Learning Expectations: Computer Science

When/how will homework be set?	Students are given login details for a website that lists all topics in the specification. Under each topic are links to webpages and videos relevant to that topic. For homework, Students are given a topic and they have to use the given resources to produce a set of A4 notes on the topic in their homework book.
How long should each task take?	Approximately 30 minutes.
Will this work be marked by a teacher?	No
How will Home Learning/intervention tasks be used if a student is underachieving?	Should the end of strand assessments show underperformance, booster tasks are set for students to complete independently at home and during Friday lunchtime booster sessions in E1 with Mr Holmes. A deadline is given and the student meets with the class teacher to show the booster work and discuss any misunderstandings. After submission the student repeats the strand assessment to measure progress.

Y9 STRAND 2 (T6-8) IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Purpose of Random Access Memory
- Purpose of Read Only Memory
- Difference between RAM and ROM
- Need for Virtual Memory
- Flash memory
- Flowcharts & pseudocode
- Programming techniques
o Variables
o Assignment
o Selection

Assessed Tasks:

Each theory lesson students complete exam style questions in their assessment books.

At the end of each strand a range of assessments take place that include multiple choice questions and traditional exam questions.

SMSC & British Values:

S: Investigate Quantum Computing

M: Understanding the consequences of behaviour and actions

S: Working together to decompose problems and plan solutions

C: History of Computing - gaining an appreciation of the achievements of innovators and understand how they overcame historical attitudes.

Enrichment Ideas:

Explorer online shops to see the amount of RAM of laptops and PC's. Is there a difference in price the more RAM you have?

Assessment Criteria:

Grade 3-4:

- Explain RAM and ROM
- Explain what virtual memory and flash memory are

Grade 5-6:

- Explain what RAM and ROM are used for, using some of the keywords
- Explain how a lack of RAM can affect performance, discussing virtual memory use and disadvantages
- Give a range of examples of flash memory

Grade 7-9:

- Can create a detailed visualisation of how RAM and ROM work using all of the keywords
- Can explain how RAM uses addresses
- Discuss virtual memory, disk thrashing, paging/swapping, fragmented memory and addressing issues
- Research the electronic differences between Flash memory and RAM

Literacy/Numeracy:

Key words: Central processing unit, Random Access memory, Volatile, Read Only Memory, Non-Volatile, BIOS, Firmware, Disk Thrashing, Virtual Memory, Flash Memory, Portable, Internal, External, Secondary Storage.

Careers Links(CAEIG)

IT Technician

IT Systems Engineer

IT Support

Network Manager

Intervention Tasks:

Consisting of:

- Lecture videos
- Keyword definition
- Key questions
- Research & present

Depending on the individual student's area of weaknesses highlighted by end of strand tests, students are set a range of the above tasks to bridge the gap in their understanding.

Year 9 Home Learning Expectations: Computer Science [common for each strand of the year within a subject]

When/how will homework be set?	Students are given login details for a website that lists all topics in the specification. Under each topic are links to webpages and videos relevant to that topic. For homework, Students are given a topic and they have to use the given resources to produce a set of A4 notes on the topic in their homework book.
How long should each task take?	Approximately 30 minutes.
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should the end of strand assessments show underperformance, booster tasks are set for students to complete independently at home and during Friday lunchtime booster sessions in E1 with Mr Holmes. A deadline is given and the student meets with the class teacher to show the booster work and discuss any misunderstandings. After submission the student repeats the strand assessment to measure progress.

Y10 STRAND 1 (T14-18) IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- star and mesh network topologies
- Wi-Fi
- frequency and channels
- encryption
- the concept of layers
- packet switching
- Ethernet
- the uses of IP addressing, MAC addressing, and protocols including
- TCP/IP (Transmission Control Protocol/Internet Protocol)
- HTTP (Hyper Text Transfer Protocol)

- o HTTPS (Hyper Text Transfer Protocol Secure)
- o FTP (File Transfer Protocol)
- o POP (Post Office Protocol)
- o IMAP (Internet Message Access Protocol)
- o SMTP (Simple Mail Transfer Protocol)

Assessed Tasks:

Each theory lesson students complete exam style questions in their assessment books.

At the end of each strand a range of assessments take place that include multiple choice questions and traditional exam questions.

SMSC & British Values:

S: Consider & reflect on the level of encryption on online services

M: When is data secure enough?

S: The ways in which technology help us communicate

C: The importance of networks talking the same language across cultures

Enrichment Ideas:

Can you find the IP and MAC addresses of the devices you have at home? How could you find them and what could you find out from them?

Assessment Criteria:

Grade 3-4

- identify star and mesh topologies
- Discuss Wi-Fi frequency and channels
- explain the need for Wi-Fi encryption
- Identify some network protocols

Grade 5-6

- Discuss the pros/coms of different topologies
- Explain packet switching
- Describe IP and MAC addressing addressing
- Explain the purpose of the listed network protocols
- Explain the need for layering

Grade 7-9

- Justify the choice of network topologies
- Can explain the purpose of each of the listed protocols
- Explain the difference between network protocols

- Identify the protocols within the layer four layer model

Literacy/Numeracy:

Key words: star, mesh, ring, bus, network, Wi-Fi, frequency, channels, Ethernet, protocol, ip, mac, tcp, http, https, ftp, pop, imap, smtp, layers, packet, packet switching.

Careers Links(CAEIG)

Network manager

IT technician

It systems & support

Intervention Tasks:

Consisting of:

- Lecture videos
- Keyword definition
- Key questions
- Research & present

Depending on the individual student's area of weaknesses highlighted by end of strand tests, students are set a range of the above tasks to bridge the gap in their understanding.

Year 10 Home Learning Expectations: Computer Science

When/how will homework be set?	Students are given login details for a website that lists all topics in the specification. Under each topic are links to webpages and videos relevant to that topic. For homework, Students are given a topic and they have to use the given resources to produce a set of A4 notes on the topic in their homework book.
How long should each task take?	Approximately 30 minutes.
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should the end of strand assessments show underperformance, booster tasks are set for students to complete independently at home and during Friday lunchtime booster sessions in E1 with Mr Holmes. A deadline is given and the student meets with the class teacher to show the booster

	work and discuss any misunderstandings. After submission the student repeats the strand assessment to measure progress.

Y10 STRAND 2 (T19-20) IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

Forms of attack.

Threats posed to networks:

- malware
- phishing
- people as the 'weak point' in secure systems (social engineering)
- brute force attacks
- denial of service attacks
- data interception and theft
- the concept of SQL injection
- poor network policy

Identifying and preventing vulnerabilities:

- penetration testing
- network policies
- anti-malware software
- firewalls
- user access levels
- passwords
- encryption

Assessed Tasks:

Each theory lesson students complete exam style questions in their assessment books.

At the end of each strand a range of assessments take place that include multiple choice questions and traditional exam questions.

SMSC & British Values:

S: Spot the creative signs of phishing

M: Legal aspects of IT, including hacking, copyright and data protection.

S: Behaving appropriately with technology

C: What legislation occurs in other cultures?

Enrichment Ideas:

Have a go at <u>McAfee's cyber security game</u>.

Assessment Criteria:

Grade 3-4

- Understand types of malware and identify differences
- Students to understand the meaning of DDOS and brute force
- Have a basic knowledge of network forensics, related laws and network policy
- Understand how to set a secure password

Grade 5-6

- Understand the different types of phishing and how they operate
- Students to understand how a botnet is created
- Have some knowledge of laws based around the misuse of tools typically used for forensic purposes
- Understand how a Ceaser Cipher works and demonstrate the ability to encrypt and decrypt messages

Grade 7-9

- Discuss how data can be intercepted.
- Explain vulnerabilities and how they can be exploited
- Template a network policy for an SME
- Discuss the effects of encryption on organisations such as the Government

Literacy/Numeracy:

Key words: Malware, virus, Trojan horse, phishing, social engineering, data interception, network policy, brute force attack, DDOS, botnet, SQL injection, network forensics, penetration testing, anti-malware software, firewall, anti-virus software, legislation, packet sniffing, user access levels, password, encryption, cipher, key

Careers Links(CAEIG)

Administration Assistant

Data Controller

IT Support

Cybersecurity

Intervention Tasks:

Consisting of:

- Lecture videos
- Keyword definition

- Key questions
- Research & present

Depending on the individual student's area of weaknesses highlighted by end of strand tests, students are set a range of the above tasks to bridge the gap in their understanding.

Year 10 Home Learning Expectations: Computer Science

When/how will homework be set?	Students are given login details for a website that lists all topics in the specification. Under each topic are links to webpages and videos relevant to that topic. For homework, Students are given a topic and they have to use the given resources to produce a set of A4 notes on the topic in their homework book.
How long should each task take?	Approximately 30 minutes.
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should the end of strand assessments show underperformance, booster tasks are set for students to complete independently at home and during Friday lunchtime booster sessions in E1 with Mr Holmes. A deadline is given and the student meets with the class teacher to show the booster work and discuss any misunderstandings. After submission the student repeats the strand assessment to measure progress.

Y11 STRAND 1 (T41-45) IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

Programming project. Students will need to plan, design, develop, test and evaluate a solution over 20 hours.

Computational thinking:

- abstraction
- decomposition
- algorithmic thinking

Standard searching algorithms:

- binary search
- linear search

Standard sorting algorithms:

- bubble sort
- merge sort
- insertion sort

How to produce algorithms using:

- pseudocode
- flow diagrams
- Interpret, correct or complete algorithms

Assessed Tasks:

Each theory lesson students complete exam style questions in their assessment books.

At the end of each strand a range of assessments take place that include multiple choice questions and traditional exam questions.

SMSC & British Values:

S: Reflect on searching and sorting algorithms and consider their use in the real world

M: Choosing the most efficient algorithm and the consequences of not
S: Working together to interpret, correct and complete algorithms
C: How might algorithms differ?

Enrichment Ideas:

Investigate algorithms and the rubics cube!

Assessment Criteria:

Programming project is externally moderated.

Grade 3-4

- Define computational thinking, abstraction, decomposition and algorithmic thinking
- Perform a linear and search
- Perform a bubble, merge and insertion sort
- Identify the core symbols in flowcharts
- Use selection in pseudocode.

Grade 5-6

- Describe key elements in abstraction, decomposition and algorithmic thinking
- Describe steps involved in a linear & binary search
- Describe the stages involved in performing a bubble, merge & insertion sort
- Follow selection within a flowchart
- Write algorithms using selection and iteration in pseudocode

Grade 7-9

- Explain how abstraction, decomposition and algorithmic thinking are components of computational thinking
- Apply abstraction, decomposition and algorithmic thinking to problems
- Write an algorithm to perform a linear & binary search
- Explain the differences between a linear and binary search
- Write algorithm to perform a bubble, merge & insertion sort
- Follow iteration and subroutines within flowcharts
- Write complex algorithms using pseudocode.

Literacy/Numeracy:

Key words: Computational thinking, binary, linear, abstraction, decomposition, algorithm, bubble sort, linear sort, merge sort, pseudocode, flowchart, decision, selection, ordered list, unordered list, process, dry run, trace table.

Careers Links(CAEIG)

Programmer

Software engineer

Data analyst

Intervention Tasks:

Consisting of:

- Lecture videos
- Keyword definition
- Key questions
- Research & present

Depending on the individual student's area of weaknesses highlighted by end of strand tests, students are set a range of the above tasks to bridge the gap in their understanding.

Year 11 Home Learning Expectations: Computer Science

When/how will homework be set?	Students are given login details for a website that lists all topics in the specification. Under each topic are links to webpages and videos relevant to that topic. For homework, Students are given a topic and they have to use the given resources to produce a set of A4 notes on the topic in their homework book.
How long should each task take?	Approximately 30 minutes.

Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should the end of strand assessments show underperformance, booster tasks are set for students to complete independently at home and during Friday lunchtime booster sessions in E1 with Mr Holmes. A deadline is given and the student meets with the class teacher to show the booster work and discuss any misunderstandings. After submission the student repeats the strand assessment to measure progress.

Y11 STRAND 2 (T29-31) IVC COMPUTER SCIENCE CURRICULUM OVERVIEW

Key Content/Topics:

- Programming project. Students are given a task where they need to plan, design, develop, test and evaluate a solution over 20 hours.
- Purpose of translators
- Characteristics of high and low-level languages
- Characteristics of an assembler, a compiler and an interpreter
- Common tools and facilities available in an integrated development environment (IDE):
  - editors
  - error diagnostics
  - run-time environment
  - translators

Assessed Tasks:

Each theory lesson students complete exam style questions in their assessment books.

At the end of each strand a range of assessments take place that include multiple choice questions and traditional exam questions.

SMSC & British Values:

S: Appreciate the complexity and differences of languages

M: Understanding the consequences of their behaviour and actions

S: Working together to establish the differences in languages

C: Consider output in different character sets

Enrichment Ideas:

Repl.it and Codecademy are excellent free online courses to revisit Python programming outside of lessons.

Assessment Criteria:

Programming project is externally moderated.

Grade 3-4

- Students can match sample pieces of code to Low/High Level Languages
- Translators can be matched to different generations of languages
- To be able to identify which language translators are used for which generations of languages.
- To match up given features with either compiler and interpreter

Grade 5-6

- Students can accurately describe the differences between Low Level and High Level Languages
- To be able to describe key features of Assemblers, Interpreters and Compilers
- To be able to describe the importance of an IDE when producing programming source code

Grade 7-9

- Advantages and Disadvantages of programming in Low and High Level languages can be evaluated.

To be able to evaluate the reasons why a programmer would make use of all three language translators during the development of software

Literacy/Numeracy:

Key words: Low Level Language, High Level Language, 1st Generation Language, Language Translator, Assembler, Machine Code, Assembly Language, 2nd Generation Language, 3rd Generation Language, Compiler, Interpreter, Device Driver, Debug, Complier, Interpreter, Assembler, Source code, Object code, De-bug, Translator, IDE.

Careers Links(CAEIG)

Programmer

Software engineer

Data analyst

Intervention Tasks:

Consisting of:

- Lecture videos
- Keyword definition
- Key questions
- Research & present

Depending on the individual student's area of weaknesses highlighted by end of strand tests, students are set a range of the above tasks to bridge the gap in their understanding.

Year 11 Home Learning Expectations: Computer Science [common for each strand of the year within a subject]

When/how will homework be set?	Students are given login details for a website that lists all topics in the specification. Under each topic are links to webpages and videos relevant to that topic. For homework, Students are given a topic and they have to use the given resources to produce a set of A4 notes on the topic in their homework book.
How long should each task take?	Approximately 30 minutes.
Will this work be marked by a teacher?	No
How will Home Learning/ intervention tasks be used if a student is underachieving?	Should the end of strand assessments show underperformance, booster tasks are set for students to complete independently at home and during Friday lunchtime booster sessions in E1 with Mr Holmes. A deadline is given and the student meets with the class teacher to show the booster work and discuss any misunderstandings. After submission the student repeats the strand assessment to measure progress.